

Chapter 10

TECHNOLOGY

In our vision of communities of understanding, digital technologies are used to interweave school, homes, workplaces, libraries, museums, and social services to reintegrate education into the fabric of the community. Learning is no longer encapsulated by time, place, and age but has become a pervasive activity and attitude that continues throughout life and is supported by all segments of society.

DEDE, 1998



TECHNOLOGY

To meet the demands of the 21st century, students need to acquire a whole new set of skills. Students need to be able to use a variety of tools to search and organize information, to generate new data, to analyze and interpret meaning, and eventually transform this into something new. What role does technology play in this “information transformation”? How does the use of technology impact instruction in health and physical education? This chapter focuses on some of the technological advances that currently impact instruction in health and physical education.

TECHNOLOGY: MORE THAN COMPUTERS

New technology-based models of teaching and learning have the power to dramatically improve educational outcomes. Unfortunately, the cost of technology, its rapid evolution, and the special knowledge and skills required for its use pose significant barriers to its implementation (Dede, 1998). Implementing technology-based models of teaching must begin with the development of a district-wide technology plan created by a committee of teachers and school administrators, parents and students, and business and community leaders. Without substantial and extended professional development in the innovative models of technology-based instruction, many educators do not use the devices to their full potential. Additionally, school districts must consider the maintenance and upgrading of technological devices as part of the overall plan.

The Internet already connects schools with one another, with homes, businesses, libraries, museums, and community resources. It allows teachers to draw on the resources of other teachers and to tap a wide range of technical and business experts. For teachers of health and physical education, the Internet opens doors to current health data. It allows a physical education teacher to choose a pre-designed step aerobic routine for today’s class. Students can research the latest advances in the treatment of Alzheimer’s Disease, investigate product safety claims, and plan a fitness day with thousands of students from around the world.

Technology is more than computers. Technology helps teachers and students solve problems. Project-based learning enables students to investigate a problem of personal interest and allows the student to track his/her own progress. Using **problem-solving software** students design flow charts and algorithms, create data-bases, and incorporate the information into project designs and reports. Using technology, students exchange electronic documents (e.g., up to the-minute reports from CDC), transmit audio and digital video, and shop on-line. In addition, emerging advances in **simulation technology** and **computational power** will allow students to participate in situational learning via **immersive virtual reality**. Advances in virtual reality devices (e.g., special glasses, hand-held wands) enhance the life-like effects of the environment and allow learners to collaboratively interact with the simulation (Dede, 1998). Far more advanced than the driving simulators still used in a number of school districts, these devices will enable students to experience and react to real-life situations (e.g., driving under the influence).

Health and physical education teachers regularly incorporate visual technology into classroom instruction. **Video cassettes and laser disks** can be used to:

- Introduce new concepts, review prior knowledge, or trigger discussion (e.g. an open-ended vignette on violence)
- Demonstrate model performances (e.g., tennis serve in fast and slow motion)
- Demonstrate game/sport strategies (e.g., diagramming plays)
- Analyze movement skills (e.g., frame-to-frame analysis of a runner)
- Provide stimulus for mental imagery (e.g., visualizing the perfect golf swing)
- Administering tests and quizzes (e.g., identifying critical errors in a golf swing)
- Create a medium for student projects

Camcorders and digital cameras allow students to see themselves in action. Students can compare their performance to model performances. In addition, students can use the devices to create their own video projects. These cameras can be used to:

- Provide skill feedback and self analysis (e.g. critiquing a role play of refusal skills)
- Analyze and compare the use of movement principles and concepts (e.g. comparing the speed of approach and body position in long jump)
- Support student projects (e.g., creating a musical ad for a health product)
- Assess learning (e.g., comparing skill development from the beginning to the end of the year)
- Monitor student behavior and activity (e.g., recording activity of one group while working with another)

Health and physical education teachers can use **computers** for a variety of purposes. Teachers and students can use software to produce health and physical education newsletters, create calendars and puzzles, and develop signs, posters, and illustrations for the classroom or gymnasium. Using specialized software, students can participate in a cardiovascular risk assessment, analyze their nutritional intake, or determine their fitness level. In addition, students can design an individualized weight/strength program, analyze their body composition, or create a simulated health history. Electronic portfolios can help students compile evidence of learning over time. In addition, teachers and students can use Internet sites and listservs for updated information, research, and teaching ideas. A list of Websites can be found in Appendix A.

Computer-assisted instruction (CAI) allows students to proceed at a rate that is appropriate and meaningful to them. There are several kinds of CAI software available for use in health and physical education programs. They include the following:

- Drill and practice (e.g., learning the names of muscles or rules of a sport)
- Tutorials (e.g. learning the parts of the heart and taking one's pulse)
- Programmed instruction (e.g., learning the key elements of a tennis serve and volley, one step at a time)
- Educational games (e.g., learning the rules of football while playing a simulated game)
- Simulations (e.g., determining the effects of alcohol consumption at a party) (Mohnsen, 1995)

Health and physical education teachers frequently use technological devices as a matter of course in the instructional setting. Such devices might include:

- **Digital Blood Pressure Machines**
Provides visual representation of the student's pulse and blood pressure
- **Body Composition Analysis**
Informs student of his/her percent of body fat
- **Automatic Skinfold Calipers**
Uses a built-in computer to calculate and display the percent of body fat
- **Heart Monitor**
Records pulse rate during exercise
- **Timing Devices**
Stores times and numbers, provides split times, lap times, and places
Transfers information to computer for print-out (Mohnsen, 1995)
- **Handheld Recording Devices**
Includes pen-based and handheld computing devices used to collect information in an outdoor setting
Includes electronic clipboards and message pads (Dorman, 1998)

Finally, technological advances have led to exercise devices that work specific muscle groups. Research has enabled the creation of safe and efficient exercise equipment designed to maximize workout time with minimal chance for misuse or injury. This equipment makes it easier for teachers and students to focus on fitness strengths and weaknesses. Innovative fitness technology equipment can be found at most large fitness centers or college training centers. Generally, this equipment is very expensive. For this reason, many students do not have unlimited access to the most modern exercise equipment available on the market today. In some schools, such equipment is only made

available to students who participate in interscholastic athletic programs. Having this equipment available as part of the regular health and physical education program significantly amplifies student interest and enhances the instructional program.

ASSISTIVE TECHNOLOGY FOR STUDENTS WITH SPECIAL NEEDS

Technology can be a great equalizer for children with disabilities. For students with impaired vision, hearing, or mobility the benefits are obvious. The benefits can be just as powerful for students with limited cognition or perception. Technological tools enable teachers to provide new and more effective learning experiences while individualizing instruction to meet a broader range of student needs. Here are some examples of the ways assistive technology can enhance health and physical education learning experiences for children with disabilities.

- Improvements in sensor controls enable subtle motor movements to control mobility devices such as wheelchairs. This allows the student increased independent movement in the school and enables participation in a wider range of activities, especially in the physical education setting.
- For a person who is blind, text can be read electronically by a digitized voice synthesizer.
- Amplification devices can filter extraneous background noise (e.g., on the playground, gym) for the hearing impaired.
- Word processing editing, spelling, and grammar checks assist students to perform in regular classroom environments.
- Larger computer screens (e.g., 20 inch), cameras with zoom lenses, and enhancement software can enlarge video images.
- Braille can be translated to and from text, making communication between users and non-users possible.
- Telecommunications Devices for the Deaf (TDDs) and Teletypewriters (TTYs) act much like electronic mail.
- Vibrating pagers, motion detectors, and visual indicators (e.g., lights for telephone rings) can signal students for certain activities.
- Larger control buttons on keyboards and remote devices promote independence.
- Voice recognition devices enable a high-level quadriplegic complete control of computer software.
- Touch screen monitors, adaptive switches (e.g. joysticks), and a trackball can be used to activate a computer, thus enabling a child to take part in a sport simulation (Behrmann, 1998).

Chapter 9 of this *Framework* proposed sample adaptations for students with diverse learning needs. Many of the tools mentioned in this chapter can be used to enhance and support the instructional

methodologies described throughout this document. The possibilities are endless with advances in technology. These technological adaptations enable each student to fulfill his/her potential, actively engaged in the school community.

SUMMARY

At the present time, many health and physical education teachers may not have access to the technological devices discussed in this chapter. However, the use of technology is important for students in all disciplines. Students need to see how technology is used within a real-world context. Technology can be used to enhance and support instruction for all students, creating student interest and providing students with valuable skills. As students and teachers prepare for the new millennium, technology and the community it creates grow as vital parts of educational reform. Health and physical education teachers need to increase their efforts to become technologically fluent and to incorporate various technological devices into their instructional program.